

Title: Are You a Hot Shot?

Brief Overview:

Students divided into small cooperative groups will perform free-throw shots using three varieties of balls. They will use the statistical information to draw conclusions and to make graphs and to calculate mean, median, and mode. Bar graphs, scatter plots, and statistical computation will be done from data using a graphing calculator.

Link to Standards:

- **Problem Solving** Students will demonstrate their ability to collect data, answer open-ended questions related to the collected data, and use technology to plot results.
- **Reasoning** Students will demonstrate their ability to reason mathematically. They will make conjectures, gather data, and build arguments.
- **Number & Number Relationships** Students will use their ability to apply concepts of comparison measurement using bar graphs and scatter plots.
- **Statistics** Students will demonstrate their ability to collect, organize, and display data and will interpret information obtained from free throw tosses.

Grade/Level:

Grades 5-8

Duration/Length:

This activity will take 3 to 5 days. The activities may take longer than anticipated depending on class duration/size and student's prior knowledge.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Using scatter plots and bar graphs
- Graphing
- Measuring
- Collecting data
- Calculating mean, median, and mode

Objectives:

Students will be able to:

- work cooperatively in groups.
- gather and interpret data from resources.
- sketch scatter plots from a graphing calculator.
- evaluate a situation and give appropriate support for their answer.
- develop a conclusion supporting their predictions.

Materials/Resources/Printed Materials:

- Pencils and paper
- Graphing calculator (i.e. TI-80)
- 3 types of balls (i.e. Nerf ball, rubber ball, paper ball, tennis ball)
- Trash can (which will be used as the basketball hoop)
- Student worksheets 1-4

Development/Procedures:

- Teacher should fill in the names of all students on worksheet **1** and make copies for each station.
- Divide class into 3 groups - one group for each type of ball.
- Tossing the ball from 1, 2, and 3 meters, the students will record their successes with x's and their misses with o's for each of the different balls that will be used.
- Using this data, the students will create bar graphs and scatter plots for each of the different distances for their group. They will record this on worksheets **2, 3** and **4**.
- Using the statistical information, the students will calculate the mean, median and mode of the results of the successful throws of each distance. Record this data on worksheet **2**.
- Using the data from the bar graph, students will interpret the reasons for the various results and record their conclusions on the back of worksheet **2**.

Evaluation:

Students will be observed throughout the lessons for evaluation while working in groups. The teacher should look for group participation and cooperation.

Assessment/Extension:

- Discuss with students what they know about scatter plots and bar graphs.
- Invite students to analyze sets of statistics from the sports page.
- Ask students to describe what these displays can tell about the data and what kind of visual picture each represents.
- Ask questions to help students analyze and state the difference between the two graphs.
- The questions below could be used for assessment:
 1. Which shows all the data?
 2. Which shows how the data are dispersed?
 3. Which is more like a frequency table?
 4. Which do you find easier to understand and use? Explain.
- Lines of regression can be calculated using the graphing calculator.

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ARE YOU A HOT SHOT?

Name _____

Class _____ **Chart** for _____ (type of ball)

Procedures

1. Each student in your group is to attempt 5 free throw shots from each distance.
You will stand 1,2, and 3 meters away from the basket.
2. Record the results of each attempt on the chart below at each station. Use X for shots made and O for each miss.

	Name	One Meter	Two Meters	Three Meters
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
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21				
22				
23				
24				
25				
26				
27				
28				

ARE YOU A HOT SHOT?

Name _____

Class _____

MEAN MEDIAN AND MODE for _____ (type of ball)

One meter

Mean _____

Median _____

Mode _____

Two meters

Mean _____

Median _____

Mode _____

Three meters

Mean _____

Median _____

Mode _____

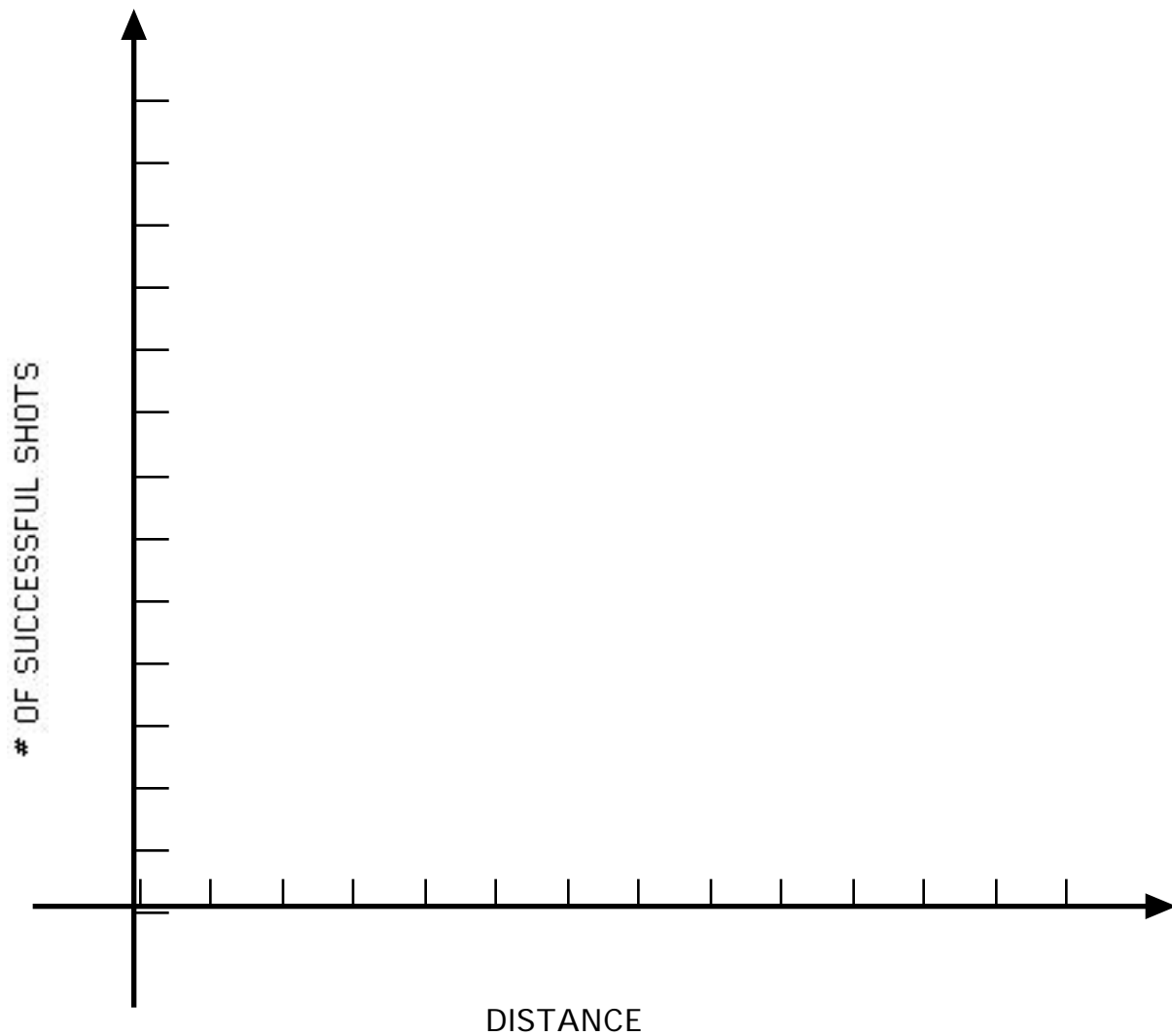
ARE YOU A HOT SHOT?

Name _____

Class _____

SCATTER PLOT for _____ (type of ball)

Sketch the graph from the calculator



TI-80 PROCEDURE TO MAKE A SCATTER PLOT

To Clear Memory:

Turn on the calculator and press **2nd, 0** to clear the memory. Press **3[reset], 2[reset]**.

To Enter Data:

1. Press the **Stat** key, the **1[edit]**.
2. Enter all the x-values in the L1 column. Put one number in and press enter.
3. Press the **blue right arrow key**. Now enter the y-values under L2 in the same way the x-values were entered.

To Ready The Graph:

1. Press **2nd Stat Plots**(the $y=key$).
2. Press **1** to display plot1.
3. Move the cursor to highlight the scatter plot, then press **enter**.
4. Press the **blue down arrow key** to highlight the scatter plot, then press enter.
5. Press the **blue down arrow key** to highlight L1 and press **enter**.
6. Press **blue down arrow key** and arrow across to highlight L2, then press **enter**.
7. Press **blue down arrow key** to highlight the marking you want to use and press **enter**.
8. Press **window** key and make any necessary adjustments.
9. Press **graph**.

To Determine The Line of Best Fit:

1. Press **Stat** then use the to move cursor to [calc].
2. Press **3** to select Linreg(ax+b).
3. Press **2nd L1, comma, 2nd L2, enter**.
4. Press **Y=** and place the cursor at y1.
5. Press **Vars**.
6. Press **2[statistics]** and arrow across 2 places to [Eq].
7. Press **5[regeq]**.
8. Press **graph**.

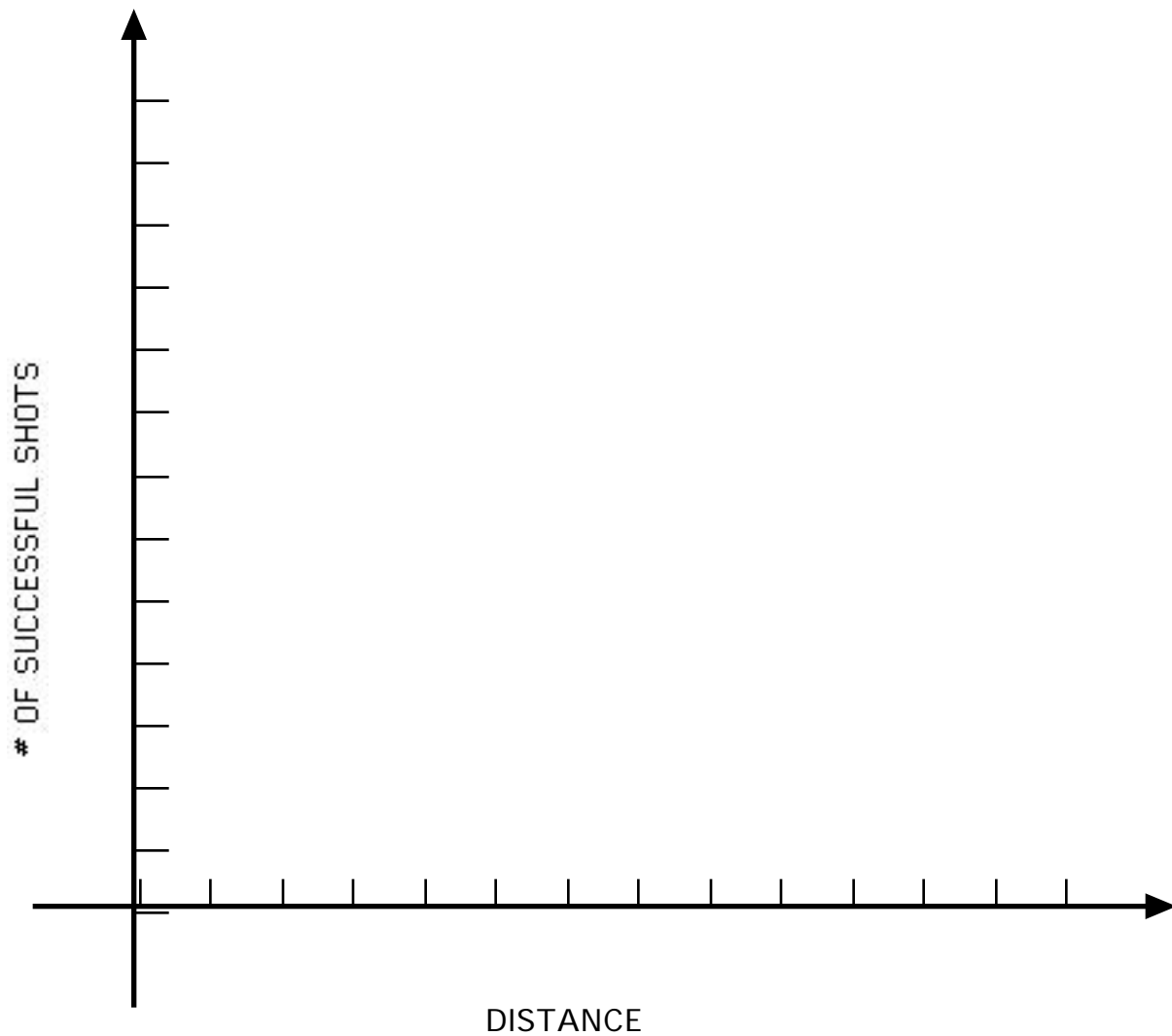
ARE YOU A HOT SHOT?

Name _____

Class _____

BAR GRAPH for _____ (type of ball)

Sketch the graph from the calculator



Rubric for Assessment

4	Student has accurately gathered all data from scatter plots and bar graphs. Student has interpreted data and evaluated information giving appropriate and justified responses to support their answer.
3	Student has accurately gathered all data from scatter plot and bar graph. Student has used information from gathered data to draw conclusions to support their answer.
2	Student has gathered data from scatter plot and bar graph. Student has demonstrated that collected data was used to draw conclusions.
1	Student has gathered data inaccurately. Student has made weak or vague arguments in evaluating information. Student has not made connection from gathered data to draw an appropriate or justified interpretation of information.
0	Student has made little or no attempt in gathering data. Scatter plots and bar graph are incomplete. Little or no responses were noted in support of their conclusions.